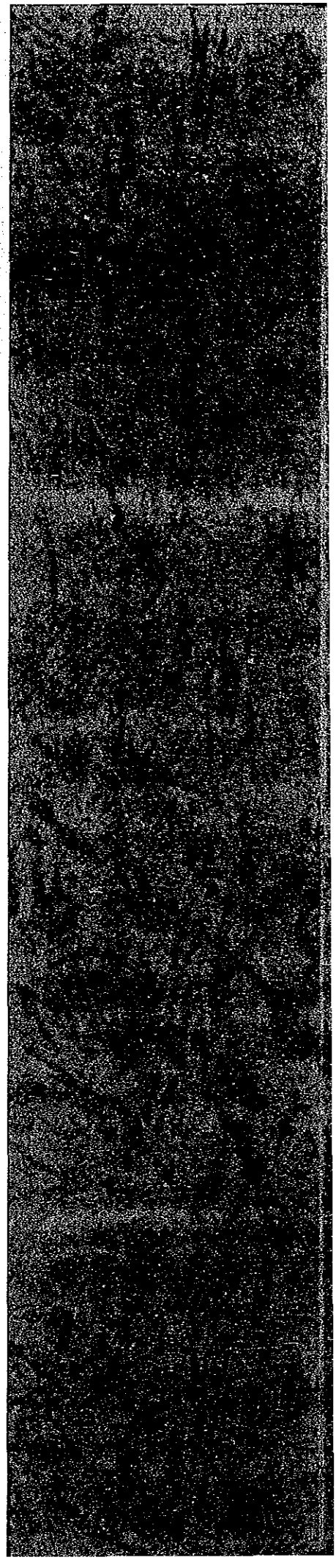
THE GOVERNMENT OF MALAYSIA

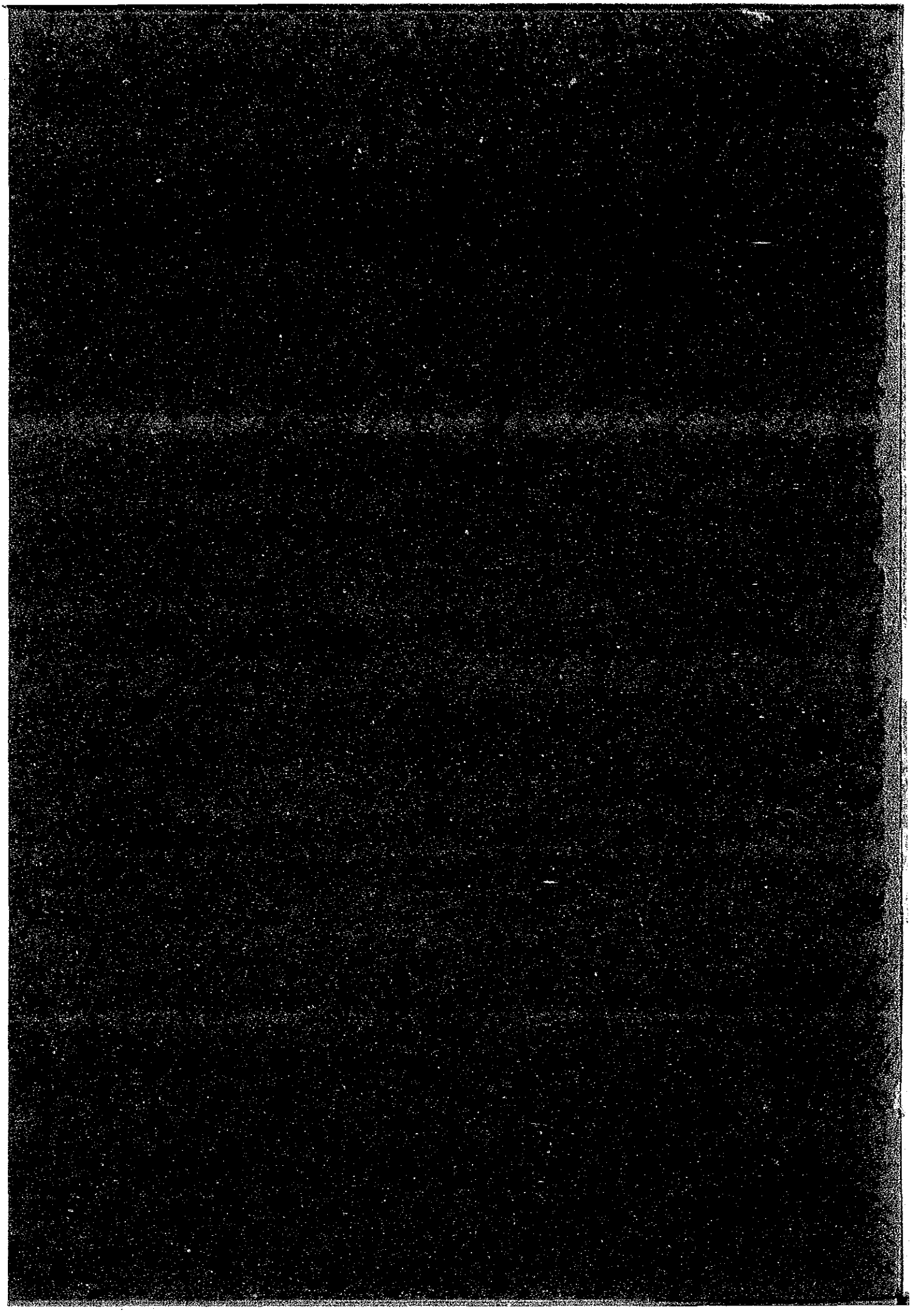
REGIONAL STUDY ON THE INTEGRATED DEVELOPMENT OF SOUTH TERENGGANU

EXECUTIVE SUMMARY

AUGUST 1985

JAPAN INTERNATIONAL COOPERATION AGENCY





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PREFACE

It is with great pleasure that I present this report entitled "Regional Study on the Integrated Development of South Terengganu" to the Government of Malaysia.

This report embodies the result of a survey which was carried out in the South Terengganu Area, the State of Terengganu from January, 1984 to May, 1985 by the Japanese survey team commissioned by the Japan International Cooperation Agency following the request of the Government of Malaysia to the Government of Japan.

The survey team, headed by Mr. Teruhiko Horie, had a series of close discussion on the project with the officials concerned of the Government of Malaysia and conducted a wide scope of field survey and data analyses.

I hope that this report will be useful as a basic reference for development of the region.

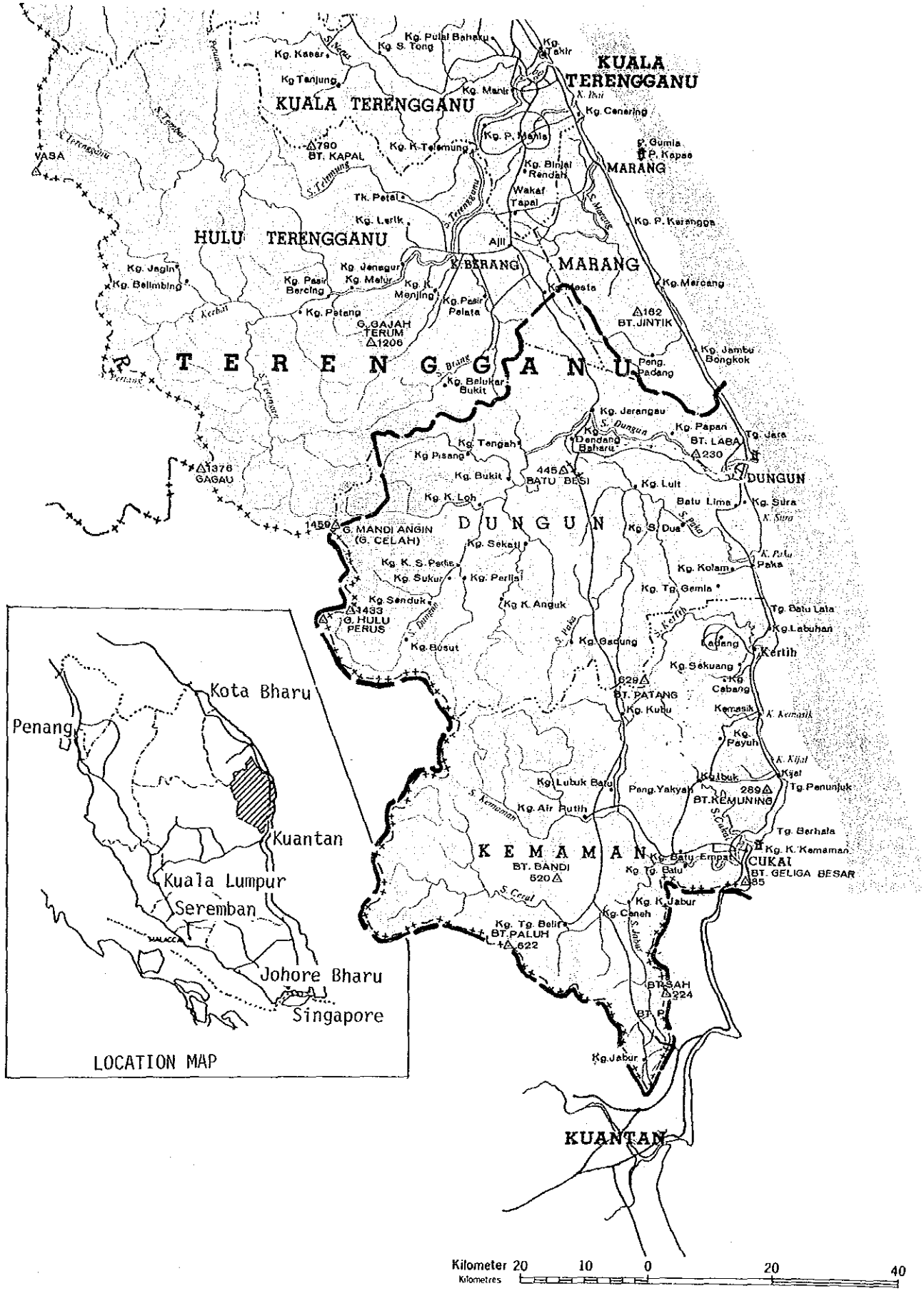
I wish to express my deep appreciation to the officials concerned of the Government of Malaysia for their close cooperation extended to the survey team.

August, 1985

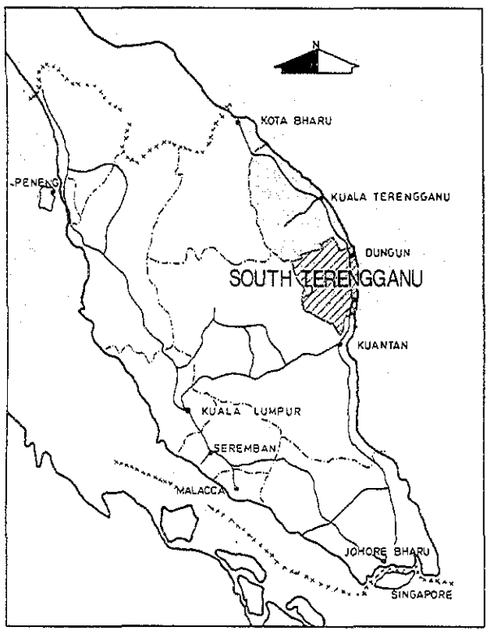
Keisuke Arita

President

JAPAN INTERNATIONAL COOPERATION AGENCY



LOCATION MAP OF THE STUDY AREA



LOCATION MAP

LEGEND

TRANSPORTAION

- INTER-REGIONAL MAJOR ROAD
- REGIONAL MAJOR ROAD
- REGIONAL ROAD
- RAILWAY AND STATION
- RAILWAY FUTURE EXTENSION

LANDUSE

- AGRICULTURAL DEVELOPED AREA
- AGRICULTURAL DEVELOPING AREA
- AGRICULTURAL FUTURE DEVELOPMENT AREA
- TIMBER COMPLEX
- FOREST RESERVATION
- NEW TOWNSHIP
- MINING/QUARRY DEPOSIT
- URBANIZATION AREA
- URBAN PLANNING AREA
- INDUSTRIAL AREA
- PRESERVATION/OPEN SPACE

SETTLEMENT/FACILITIES

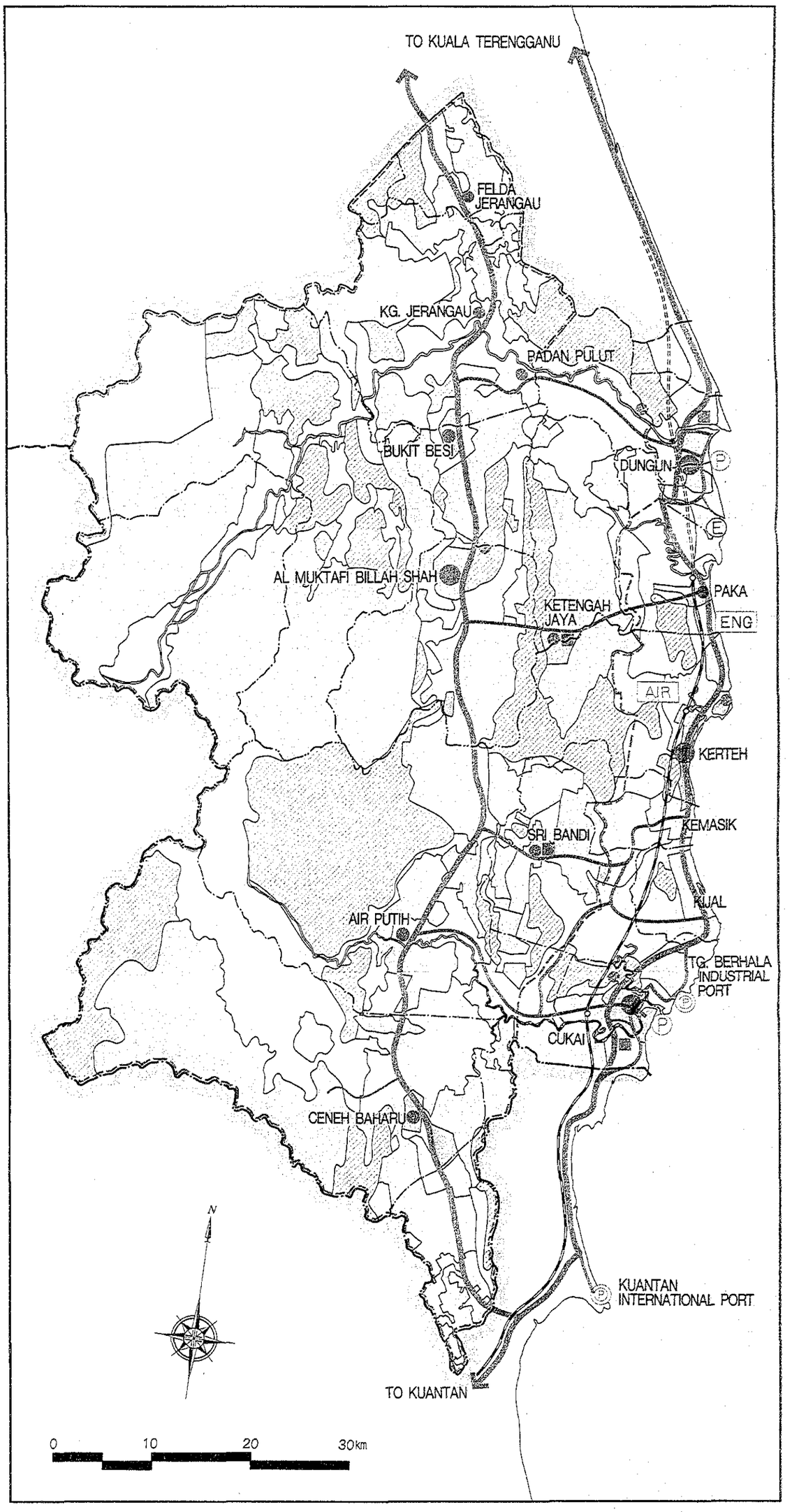
- SUB-REGIONAL CENTRE
- SUB-DISTRICT CENTRE
- PORT
- INTERNATIONAL PORT
- AIR — AIRPORT
- INDUSTRIAL ESTATE
- E — HIGH EDUCATIONAL
- RECREATIONAL
- ENG — ENERGY CENTRE

BOUNDARY

- STATE BOUNDARY
- SOUTH TERENGGANU SUB-REGION AREA
- DISTRICT BOUNDARY
- SUB-DISTRICT(MUKIM) BOUNDARY
- KETENGAH AREA

REGIONAL STUDY ON THE INTEGRATED DEVEVOPMENT OF SOUTH TERENGGANU, August 1985

THE GOVERMENT OF MALAYSIA/JAPAN INTERNATIONAL COOPERATION AGENCY



SUB-REGIONAL DEVELOPMENT PLAN IN SOUTH TERENGGANU

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1. OBJECTIVES

1.1 Background

The South Terengganu area has been designated as a regional development area, since the early 1970s, where tree crop production has been intensively developed. The KETENGAH has performed coordination amongst the development agencies and developed new towns and infrastructure.

The landing of off-shore oil and gas has become a new feature of the area, with indications of high potential for industrialized growth. Kerteh town development has been implemented and industrial core projects such as oil refining, gas processing, steel mill, etc. were constructed on the coastal strip of South Terengganu. The Terengganu Master Plan Study also became available in November, 1983 which recommended strategies for development of the whole State.

This sub-regional study has taken into account these developments over the past few years, based on the understanding that several accomplished and on-going projects in the area would have a considerable impact on the area.

1.2 Objectives

Consistent with the growth and distribution policy of the Government of Malaysia, the objectives of the study are:

1) Prepare a sub-regional master plan for the integrated and balanced socio-economic and physical development of South Terengganu as a whole, taking into account the existing plans and programmes.

2) Identify priority projects

3) Prepare pre-feasibility studies for priority projects

This study has been prepared as a Sub-Regional Study for the Integrated Development of South Terengganu within the context of the Terengganu Master Plan Study, and as a result the rationale for the objectives and strategies of the Master Plan have been reflected herein.

1.3 The Study Area

Location

The South Terengganu sub-region is located between Kuala Terengganu and Kuantan and is about 120 kilometres from north to South and 60 kilometres from east to west and is about 500 kilometres from the Federal Capital of Kuala Lumpur.

The study area covers 5,370 km^2, roughly 40 percent of the Terengganu state, of which the KETENGAH area covers 83 percent of the study area.

Table 1 Classification of the Study Area

(Unit: km²)

District	Dungun	Kemaman	Hulu Terengganu	Total (Share: %)	
Study Area	2,616	2,636	118	5,370	(100)
KETENGAH	2,302	2,020	118	4,440	(83)
Coastal Region	314	616	–	930	(17)

Source: Population Census, 1970.

Climate

Peninsular Malaysia has a tropical climate in which precipitation is a significantly variable climatic element. Maximum monthly rainfall occurs in December, which is about 600 millimetres or more, while a minimum of not less than 100 millimetres is the average in non-monsoon months.

This heavy rainfall sometimes results in a large run off volume into the rivers causing floods, disruption to communications and economic activities and loss of life, property and revenue.

Topography

The general profile of the topography together with precipitation and forest structure is diagramatically shown below in Fig. 1.

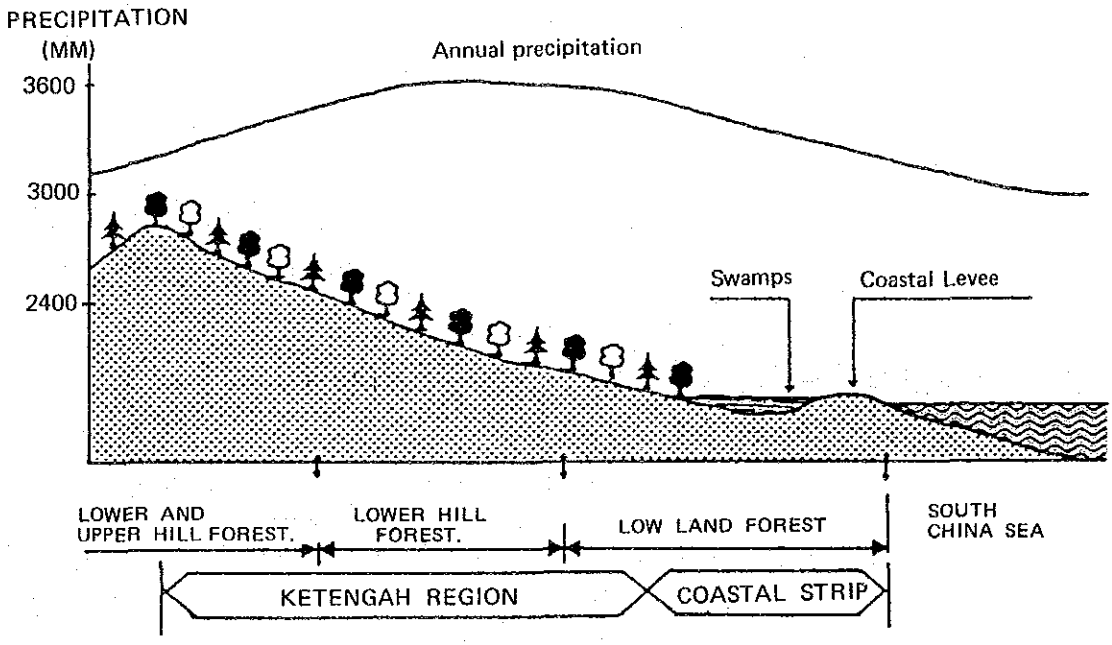


Fig. 1 GENERAL PROFILE OF NATURAL CONDITIONS

Population

The population within the area was approximately 102,400 in 1970 and 126,200 in 1980, based on the Population Census. Both in1970 and 1980, the share of the population in the coastal areas was about 71%. The population in 1983 grew further to 160,740, of which 59,500 (37%) are in the KETENGAH area and 101,300 (63%) in the coastal area. The reduced share in the coastal strip in 1983 can be attributed mainly to the population increase of the KETENGAH area.

2. NATIONAL AND REGIONAL CONTEXT

2.1 New Economic Policy

Development in Malaysia since the beginning of the decade of the 1970s has been guided towards the realization of the targets of the New Economic Policy (NEP). The NEP establishes National Development Objectives which have been prepared to achieve national unity and prosperity levels by:

- the eradication of poverty irrespective of race, and
- the restructuring of society to eliminate the identification of race with economic function.

2.2 The Regional Development Strategies of Terengganu

Based on the context of the NEP, the Terengganu Master Plan Study (TMPS) proposes to raise the state GRP per capita to the level of the national average in 2000. This means that an annual growth rate of 7 percent between 1980 and 1990 and 7.4 percent between 1990 and 2000 will have to be targeted. This signifies that the economy of the state will restructure itself from the dependence on primary industries to an increase in the proportion of manufacturing industries.

Population of the State in 2000 is forecast at 930,000 an increase from 542,000 in 1980. The average growth is 2.8% p.a. during these years.

The Master Plan requires intensive industrial development and a restructuring of the rural economy through the following policies:

1) To build up a sound industrial base for future expansion of capital and technologically advanced industries through the development of small and medium scale industries during the present decade.

2) To restructure the rural economy through: a) introducing high value added crops, b) reorganizing small-scale farm lots, c) introducing agro-based industries, d) providing supportive infrastructures and facilities and e) various other projects.

2.3 Development of the Study Area

Development strategies

The formulation of a new economic structure requires a series of development strategies.

1) Modern industries are a prerequisite factor for a re-structured economy.

2) The development of urbanized areas with modern amenities and services are necessary to support the industrialization. Infrastructure must be improved at the same time.

3) Activities in the primary sectors should be strengthened in order to have a balanced sectoral composition.

4) Vocational and professional training is necessary to further the restructuring. More people should be educated at high level institutes to meet the new requirements.

Basic premises

1) The integrated development plan to be proposed by the Study has to suggest ways of maximizing the resource utilization existing in the area and ways to obtain an optimum distribution system;

2) It is required that ongoing projects and the seeds for furhter development are incorporated into a total regional economy through an integrated development policy; and

3) An optimum human settlement system should be realized by social and physical infrastructure developments.

3. DEVELOPMENT POTENTIALS AND CONSTRAINTS

3.1 Primary Resources

The study area is endowed with major primary resources associated with existing economic development. These are identified as:

1) The major exports to other areas are palm oil, rubber, fishery and forestry products. The development of these production systems has been coordinated and intensified by KETENGAH, FELDA, SEDC, etc.

However, there is little land left for extensive land development in the agricultural sector. The proposed development in the KETENGAH area has already reached the final stage in terms of the land availability although a comparatively small forest area at Pasir Raja is untapped and is planned for further agricultural development.

Existing crop trees planted mostly in the late 1970s have gradually matured, and much more production from tree crops can be expected in the near future as shown in the following table.

Table 2 Total Production Increase of the Estate[3)]

	OIL PALM (FFB)		RUBBER (DRC)		COCOA (DCB)		TOTAL
	ha[1)]	mt[2)]	ha	mt	ha	mt	ha
1983	49,880	529,200	4,830	3,790	660	231	55,360
(%)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
1990	72,700	1,163,200	6,880	6,190	1,470	882	81,050
(%)	(146)	(220)	(142)	(163)	(223)	(382)	(146)
2000	88,000	1,551,000	8,800	10,343	3,440	2,380	100,240
(%)	(176)	(293)	(182)	(273)	(521)	(1030)	(181)

Source: Study Team

Notes: 1) Area in ha indicates the net planted area in production.
2) mt.: metric ton
3) Statistics for small holders are not available

2) Reserves of forest resources will be maintained under a selective felling programme in the KETENGAH area. A reduction in the volume of log yield to 200,000 m^3 is anticipated in the future because of the decrease in land clearance work.

3) The annual fish landing on the coast of the area from 1978 to 1980 was 15,800 tons, which was surplus to the local consumption. The surplus has been exported to other populated regions. However, the export does not bring sufficient revenue to relieve the incidence of poverity amongst the fishing community.

4) Exploitation of offshore oil since the early 1980s brought the establishment of petrochemical industries in the area, which is expected to be a leading sector in the growth of the study area. The production of crude oil and gas is managed by PETRONAS.

3.2 Socio-economic Growth

Based on the strategies and premises of the development of the area, the macro-economic projection was conducted for the years upto 2000. The gross regional product is shown in Table 3 which indicates the average annual growth of 8.4% in this period. It also presents changes in the sectoral composition by percentages.

Increases in population and employment are also forecast by using the framework of the gross regional product. They are shown in Table 4 and Table 5. Population will rise to 304,000 in the year 2000 from 161,000 in the year 1983. Employed persons will increase to 94,000 in the year 2000 from 48,000 in the year 1983.

These forecasts are used as the development targets for the study area. These forecasts can be realized when efforts, funds, and resources are incorporated in to the socio-economic activities, policies and projects, which are recommended in this study.

3.3 Constraints

Constraints and handicaps existing in the area must be overcome, in order to sustain development in line with the socio-economic framework.

Socio-economic Constraints

- Shortage of a skilled labour force to support the planned developments.
- Relatively small population and local market demand.
- Lower attractiveness of town amenities to induce active private entrepreneurs.
- Remote to the major populated market centres.

Physical Constraints

- Geographic conditions giving rise to occasional flood problems.
- Land availability for development is small for both agricultural use as will as for urban expansion.
- Core towns do not have fully developed infrastructure systems.

Table 3 Projected Gross Regional Product of the Study Area

(M$ million in 1972 price)

	1983	1985	1990	1995	2000	AGR (%) 1983–2000
Agricultural, Fishery & Forestry	133.7 (26.3)	166.3 (23.3)	232.0 (18.2)	252.6 (15.9)	280.1 (13.9)	4.4
Mining, Quarrying & Manufacturing	293.0 (57.5)	423.8 (59.3)	795.5 (62.5)	1026.6 (64.7)	1259.7 (62.8)	9.0
Construction	16.2 (3.2)	25.6 (3.6)	46.2 (3.6)	66.8 (4.2)	98.8 (4.9)	11.2
Transportation and Communication	6.5 (1.3)	10.3 (1.4)	22.6 (1.8)	27.2 (1.7)	41.2 (2.1)	11.5
Trade, Hotels and Restaurants	10.4 (2.1)	17.3 (2.4)	36.7 (2.9)	44.1 (2.8)	71.5 (3.6)	12.0
Government, Utility & Other Services	49.2 (9.6)	71.7 (10.0)	139.2 (11.0)	171.2 (10.7)	257.0 (12.7)	10.2
Total	509.0	715.0	1,272.2	1,588.5	2,008.3	8.4

Table 4 Projected Population in the Study Area

(Unit: thousand)

	1983	1985	1990	1995	2000	AGR (%) 1983–2000
Coastal Area	101.3	115.1	143.5	169.6	211.8	4.4
of which Urban Areas	54.4	64.1	83.8	101.6	131.3	5.3
KETENGAH Area	59.4	66.6	78.0	85.1	92.5	2.6
of which Town Area	26.6	33.3	43.5	50.5	58.7	4.8
Total	160.7	181.5	221.5	254.7	304.3	3.8

Table 5 Projected Employment in the Study Area

(Unit: persons)

	1983	1985	1990	1995	2000	AGR (%) 1983–2000
Agricultural, Fishery & Foresty	21,341 (44.3)	21,770 (39.7)	23,370 (34.8)	24,600 (31.8)	25,140 (26.8)	1.0
Mining, Quarrying & Manufacturing	5,604 (11.6)	8,600 (15.7)	13,790 (20.5)	17,670 (22.8)	25,090 (26.8)	9.2
Construction	3,366 (7.0)	4,220 (7.7)	5,530 (8.2)	6,860 (8.9)	8,729 (9.3)	9.2
Transportation and Communication	1,421 (11.3)	2,030 (3.7)	3,100 (4.6)	3,970 (5.1)	5,530 (5.9)	8.3
Trade, Hotels and Restaurants	5,466 (11.3)	5,996 (10.9)	7,545 (11.3)	8,947 (11.5)	10,887 (11.6)	4.1
Government, Utility & Other Services	11,032 (22.9)	12,219 (22.3)	13,830 (20.6)	15,370 (19.9)	18,370 (19.6)	3.0
Total	48,230 (100.0)	54,826 (100.0)	67,165 (100.0)	77,417 (100.0)	93,746 (100.0)	4.0

Source : Study Team

Note : Percentages are shown by the figures in the parentheses.
AGR means "average growth rate per annum".

4. REGIONAL INTEGRATION

Emphasis must be placed on the integration between the agro-based industries encouraged in the KETENGAH area and the induced industries to be fostered in the coastal strip area to ensure an orderly balanced sub-regional development. In order to realize the integration, a thoughtful formulation of policy is necessary, and it needs to be built in the following manner:

1) The first emphasis is that the KETENGAH area should be developed under its own futures programmes at the same time as making efforts to sustain a larger and stable quantity of agricultural products, simultaneously, the agro-based industries should be developed.

   Consideration is also necessary to positively promote a settled labourers and population. In this regard, the development of new settlement centres is given priority to encourage locally available daily service functions.

2) From the aspect of settlement patterns, core towns to support concentrated industrialization and urbanization are required to be encouraged and developed. These are Dungun, Kerteh and Cukai.

3) From a regional planning point of view, a proper settlement hierarchy system must be established to make the regional socio-economic activities more efficient as well as to provide all the residents with equitable services. This hierarchy system comprises the centres and their associated hinterland areas, with good accessibility from the hinterland area to the centre maintained in terms of transportation and social services. Reginal integration will be realized by establishment of this system as illustratively shown in Fig. 2.

4) Spatially the town/centres located intermediately between the inland KETENGAH area and the coastal strip area will play a significant role of integrating these two areas.

   In this regard, the new townships of Ketengah Jaya and Sri Bandi have a locational advantage to develop some intermediate industries such as goods-distribution and value-added processing industries based on forest and agro-products, to combine the inland and the coastal industries.

5) A transport network system with good accessibility to international as well as domestic markets should be structured as a whole, so as to incorporate the economy of South Terengganu sub-region into the national and international industrial systems.

   In this regard, the Port of Kuantan and the planned railway system are likely to become an important transportation mode substitution for the road transport.

6) Attention should be paid to management of the landuse and the land arrangement in both the inland agricultural and forestry areas and the coastal growth corridor area. The above policies for regional integrated development are shown in Fig. 3.

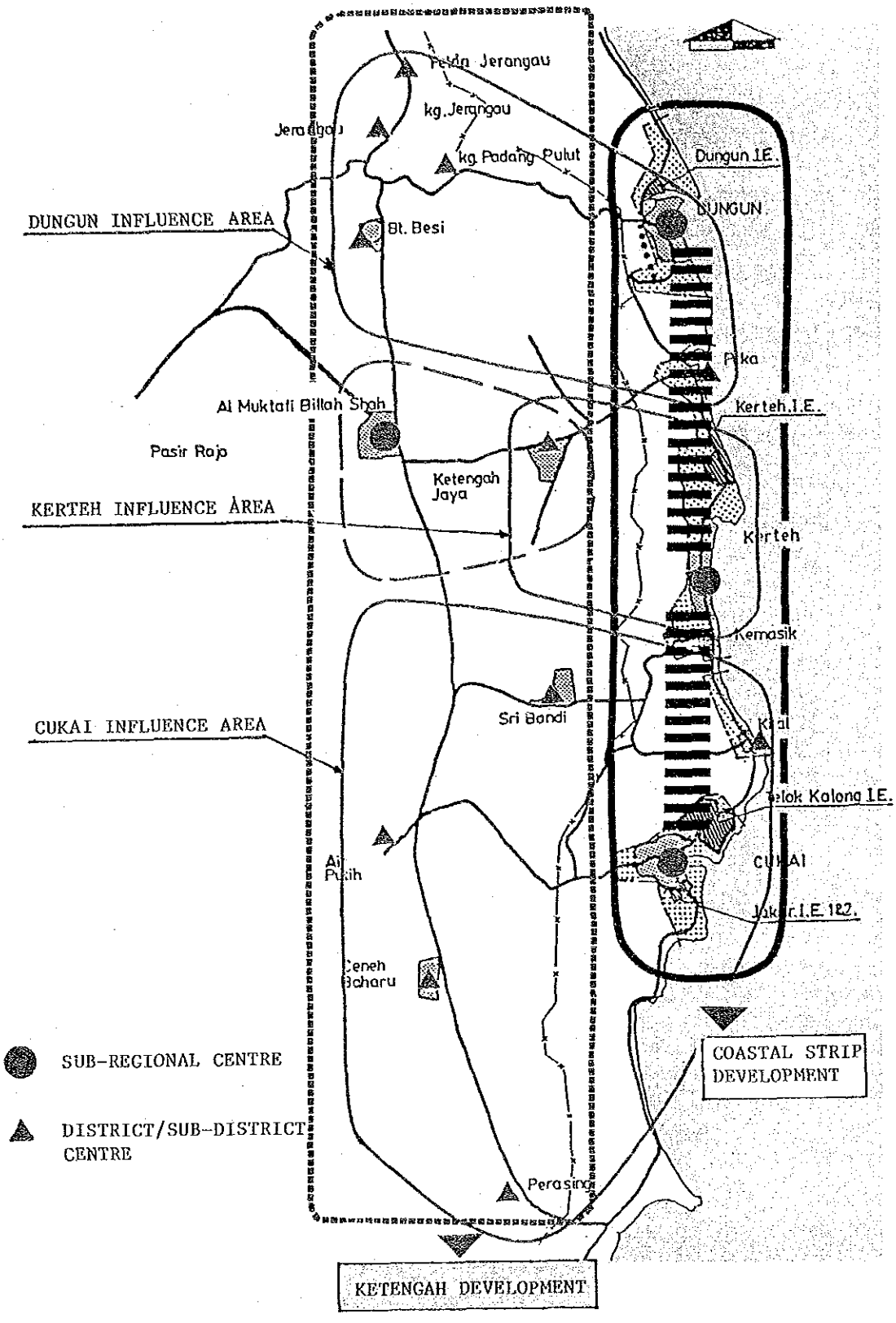


Fig. 2 SUB-REGIONAL DEVELOPMENT SYSTEM

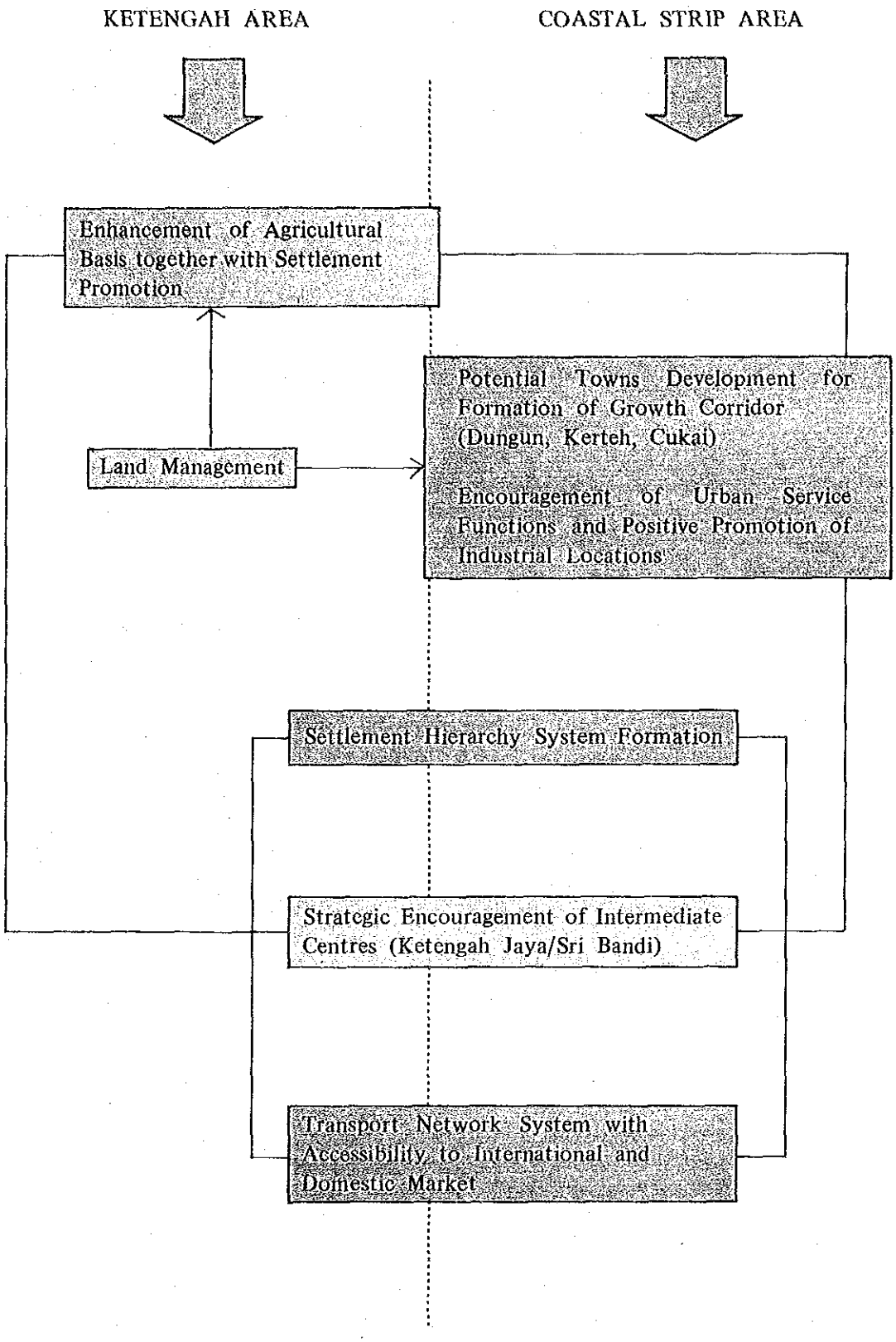


Fig. 3 POLICIES FOR INTEGRATED DEVELOPMENT

5. ECONOMIC DEVELOPMENT STRATEGIES

5.1 Agricultural Sector

The agricultural sector (agriculture, forestry and fishery) is forecast to grow 4.4% per annum, but the percentage share in the GRP of the study area will decrease as shown in Table 3. The main source of the growth is the production of oil palm fruit which is expected to grow at 6.5% per annum, followed by rubber and cocoa.

Agricultural production is mainly conducted in the inland KETENGAH area where the areas for forest and agriculture are already delineated. More than 80% of the agricultural area has been cleared and tree crops planted. Production will increase in accordance with the tree maturity. The forest area produces timber under the selective management system, which will yield a constant output in the long term.

However, the estate sector has to overcome problems of constraint in order to sustain the targeted growth. Major actions recommended to solve the problems are:

- Secure the labour force by promoting immigration into the estate communities.
- Raise the labour productivity by the use of mechanical tools, small tractors, improved farm roads, etc. Incentive payments to the worker should be taken into consideration.
- Provide better living conditions in the estate communities including the KETENGAH towns, which is a prerequisite for inducing immigrants to settle.

Besides the prevalence of the estate system of tree crop production, there will remain small scale farmers in traditional villages, although the number is considered to decrease gradually in future. Young generation has been moving out to other sectors/areas, abandoning the traditional production system. The importance of the traditional life style in kampung areas cannot be neglected in the social life of the indigenous Terengganu people.

Their production has been moderate in volume because of small cultivation size, tranditional means of production pattern, lack of incentive to introduce suitable crops, and poor soil fertilities. Agricultural extension service system has been introduced, which in cooperation with MARDI supports the village farmers to diversify crops and increase quality and quantity. It is recommended the extension service system should be intensively managed and the coverage of traditional farmers should be increased.

Fishery

To obtain a larger profit from fish and to achieve a higher standard of living for fishermen, the following measures are recommended:

- Fish should be kept as fresh as possible to obtain higher prices. For this purpose, refrigerated storage and insulated trucks should be furnished.
- The consumer's preference of the fish species should be studied.
- Artificial fish shelters in the sea-bed should be installed for experiments to maintain a steady re-production of fish.

– Experiments in finding the development of brackish and fresh water fish production should be conducted.

5.2 Industrial Sector

1) A review of the industrial development prospects shows that the coastal strip has higher potential than the estates in the inland KETENGAH area, however, some selected types of manufacturing processes are more suitable for locating in the KETENGAH area. The resource based industries engaged in primary processing of palm oil, latex, lumber, cocoa, clay for brick making etc. should continue to be located at the KETENGAH area and be expanded in accordance with the planned agricultural and other production growth.

   However, the locations of downstream industries related to petro, gas and steel should be concentrated around the existing core of those industries, particularly in the Telok Kalong industrial estate.

2) It is recommended that the State should find ways to provide the State's own specialized incentives to attract new investors, in liaison with the Federal Government. Several incentives for more effective industrial promotion, which is relevant to the south Terengganu development, are proposed with a phasing plan as follows:

Table 6 Phasing of Incentives to be Granted

Types of Incentives	Initial 1985–1990	Mid-Term 1991–1995	Latter 1006–2000
Incentives			
– Investment subsidy	o	o	* Selective application
– Lower prices for land and buildings	o	o	o
– Subsidies for training	o	**	**
– Subsidies for relocation	o	o	o
– Preferential contract	o	o	o

Notes: o - Major effort
* - Less emphasized effort.
** - Training should be in the institutes rather than by direct subsidies.

3) Upon completion of the existing development programmes for industrial estates, the coastal strip area will have a total area of about 1,400 hectares and the KETENGAH about 300 hectares. This is evaluated to be sufficient in terms of land requirements.

Unless an intensive promotion effort is made at administrative and political levels, these significient assets will turn into a severe debt because of unoccupancy of the land.

The industrial estate development should be carefully conducted so as to ensure the manufacturing development strategies. A plan applicable in the study area is recommended as shown in the Table 7.

Table 7 Industrial Estate Development Plan 1985 – 2000

	Initial	Mid-team	Latter
Plant location	Telok Kalong (Zone I)	Telok Kalong (Zone II)	Telok Kalong (Zone II & III)
		Kerteh	Kerteh
		KETENGAH	KETENGAH

4) The study examined the viability of petrochemical complex in Telok Kalong/ Kerteh. However, influencial market conditions in the world are not advantageous for immediate construction. It is recommended to study further to find a viable solution in the development of a complex.

6. INFRASTRUCTURE DEVELOPMENT STRATEGIES

6.1 Transportation

Roads

The road network has been developed to form a ladder shape comprising Route III, Jerangau-Jabor (J-J) highway, and other regional roads. In addition JKR has programmes to put in resources to improve and expand the road network in the coastal area and the inland area.

It is recommended that the road system in the urban areas of Dungun, Kerteh and Cukai be given specific consideration from the view points of traffic safety and bypass construction. Accessibility to inland village should be extended.

However, recent growth in vehicle traffic and flood damages on roads require much more repair work and maintenance. Periodic rehabilitation should be conducted not only on Route III but also on other roads including the J-J highway.

Bus service

The demand for bus services is relatively small and thus it is not attractive for bus companies to increase trip service and service lines. Increase in the ownership of cars and motorcycles is forecast to continue, which often leaves a problem for transport services for those who cannot use private means. These are the aged persons, housewives, children and poverty class families.

It is recommended that an efficient bus system is established in the industrialized corridor, with some services extending to the KETENGAH townships.

Subsidizing a part of the cost is recommended since public buses are necessary to serve for those in low income groups having no vehicles and those in rural areas where public services are not provided. Such investment and subsidies by the State Government will serve to sustain mobility.

Seaports

Tanjong Berhara Port and Kuantan Port are ready to serve international and domestic marine transport. Their capacity is adequate, while the number of ship calls is relatively small at present. It is not expected that there will be any congestion created within the next ten years or so. Dredging work should be carried out to sustain the port serviceability.

Railways

A feasibility study has been undertaken by the Malayan Railway Authority and a JICA Study Team on the east-west lines passing through the area. The results of the viability study will be available in last-1985. The railway line is proposed to run along the western side of Route III, with stations at Cukai, kerteh, Paka and Dungun and a branch line to the Telok Kalong industrial estate. Although a construction plan is premature, an outline has been incorporated in the conceptual urban plans for Dungun and Cukai.

6.2 Flood Control and Drainage

Flood Problems

South Terengganu area has suffered many floods in its history because of, 1) intense and heavy rainfall during the north-east monsoon, 2) flat topography and inadequate down stream drainage. The disruption caused by flooding is substantial to socio-economic activities because of its effect on transport and communications for long duration.

Developments in the study area has been rapid in recent years and have also occured in flood prone lands. Under these situation, no substantial investment for improvement has been made although there were some studies conducted. Resolutions to flood and other sedimentation problems are shown in Fig. 4.

The study recognized, particularly, the necessity of improvement in the drainage of Cukai town area. A prefeasibility study was conducted and a plan showing recommendations is in Fig. 5.

Programmes for the implementation of water supply for domestic and industrial uses have been studied in detail and the works are under construction. Balance of supply and demand of water should be checked stage by stage. The salinity intrusion problem at the water intakes should be solved by studying alternative plans, including the provision of a barrage.

6.3 Urban Development Strategies

Creating a combination of high level urban functions along the coastal strip Growth Corridor is the main development strategy.

Because of the shortage of land availability suitable for urbanized uses and of making use of the existing urban function characteristics, it is proposed to distribute the high level urban functions amongst the three towns in the coastal strip Dungun, Kerteh and Cukai instead of developing one large core town. For maintaining these functions with a sufficient service level, improvements in mobility in the corridor is a significant factor.

For other small townships in both the coastal area and the KETENGAH area, improvements to amenities and infrastructure should be carried out in line within the context of a functional hierarchy of townships in the area.

1) Conceptual structure plan of Dungun

Dungun Town is divided into two by the Dungun River: the north and the south areas. The north area is recommended to be basically preserved because of the existance of natural and tourism assets such as Rantau Abang.

Urbanization is to be promoted in the south area in a southerly direction but an extensive expansion of urbanization area should be avoided. The locations of high educational facilities to be developed are concentrated in the southern part where the I.T.M. is located. A by-pass is necessary as proposed in the conceptual plan.

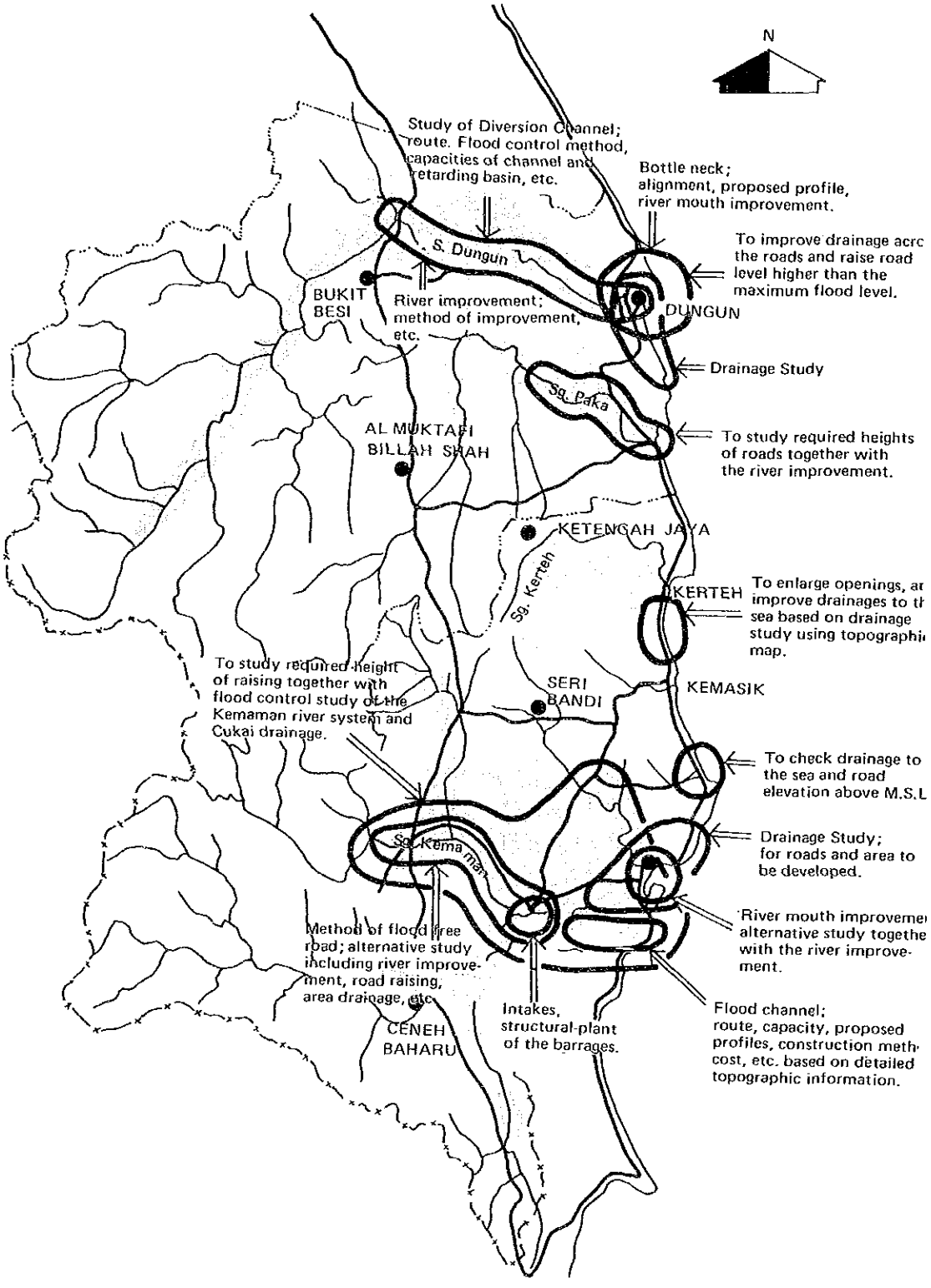


Fig. 4 RECOMMENDATION FOR FLOOD CONTROL PROGRAMME

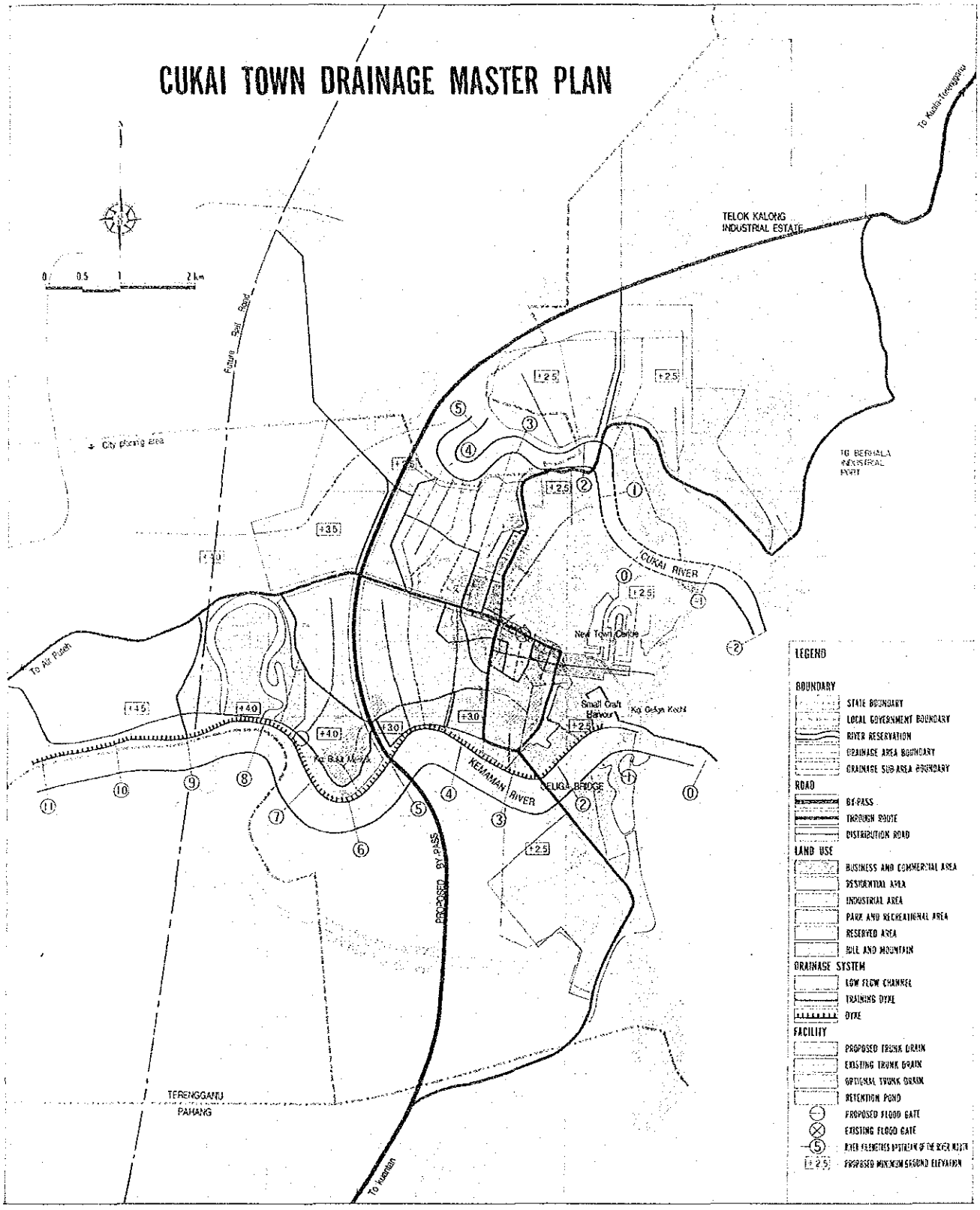


Fig. 5 CUKAI TOWN DRAINAGE MASTER PLAN

A conceptual structure plan is shown in the following Fig. 6. The railway station is proposed in the new developed area in the western part of the town.

2) Conceptual structure plan of Cukai

The Cukai Town area is divided into three areas by two rivers of the Cukai River and the Kemaman River, i.e., the north, the central and the south areas. The north area centering on the Telok Kalong industrial estate is characterized as an industrial promotion area. The central area is to accommodate mainly urban service activities such as commercial, business and other administrative functions. The south area is for new urban development. Urbanization will be promoted mainly in the central area toward the west up to the line of the planned railway.

The project for flood control, that is, the change of alignment of the Kemaman River and the development of a diversion canal, will have a great impact on the urban structure of Cukai, as a new area for urbanization will be created in the eastern part of the town by this project.

The by-pass of Route III is proposed for Cukai Town as well. This will function as a new backbone of the urban activities and contribute to expansion of the required urbanization area.

The railway station, if it is completed, will also impact on the urban structure. Generally this kind of facility is endowed with a capability of form a new commercial sub-centre. The eastern side of the planned station is recommended to be designated as a specific development area of about 200 hectares, and disorderly private developments in this area should be restricted until a definite development master plan in this area is completed.

A conceptual urban structure plan is shown in the following Fig. 7.

6.4 Human Resource Development

Location

Along with the forthcoming industrialization, it is necessary to increase research institutes, higher educational schools and vocational training schools in the area to supply sufficient manpower with required knowledge and technology.

Institutes for human resource development are recommended to be invited to locate particularly at Dungun, where is the most suitable for the location of these institutes and is to be characterized as the town for education and research institutes.

Institutes

Recommended institutes at the tertiary level of the education system will include a teacher's training college, a polytechnic school and a university with faculties in technology and science. In addition to the above educational system, vocational training schools covering the local need for re-adjustments and for the newly required skills should be invited to the location.

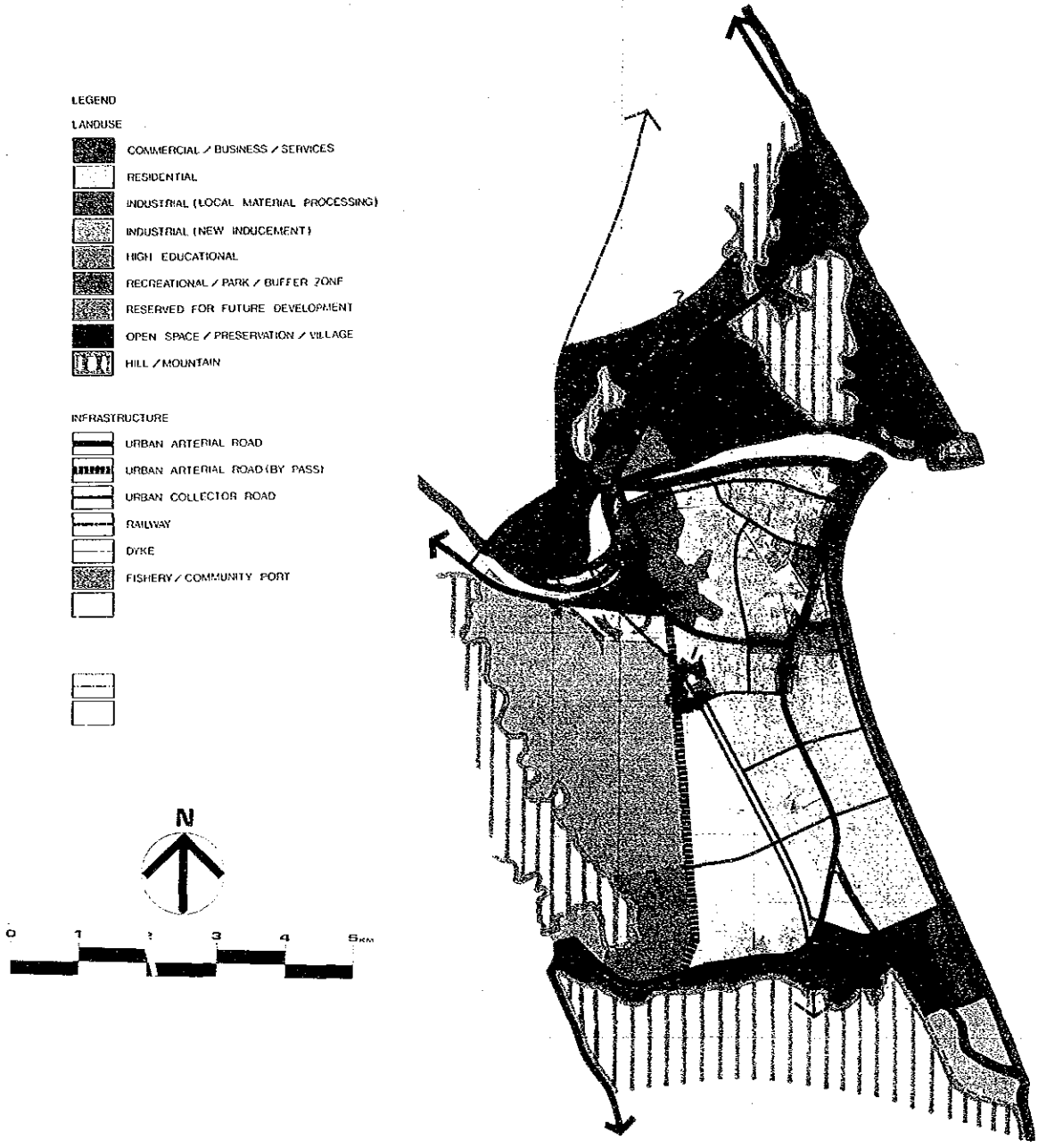


Fig. 6 DUNGUN URBAN DEVELOPMENT IN 2000

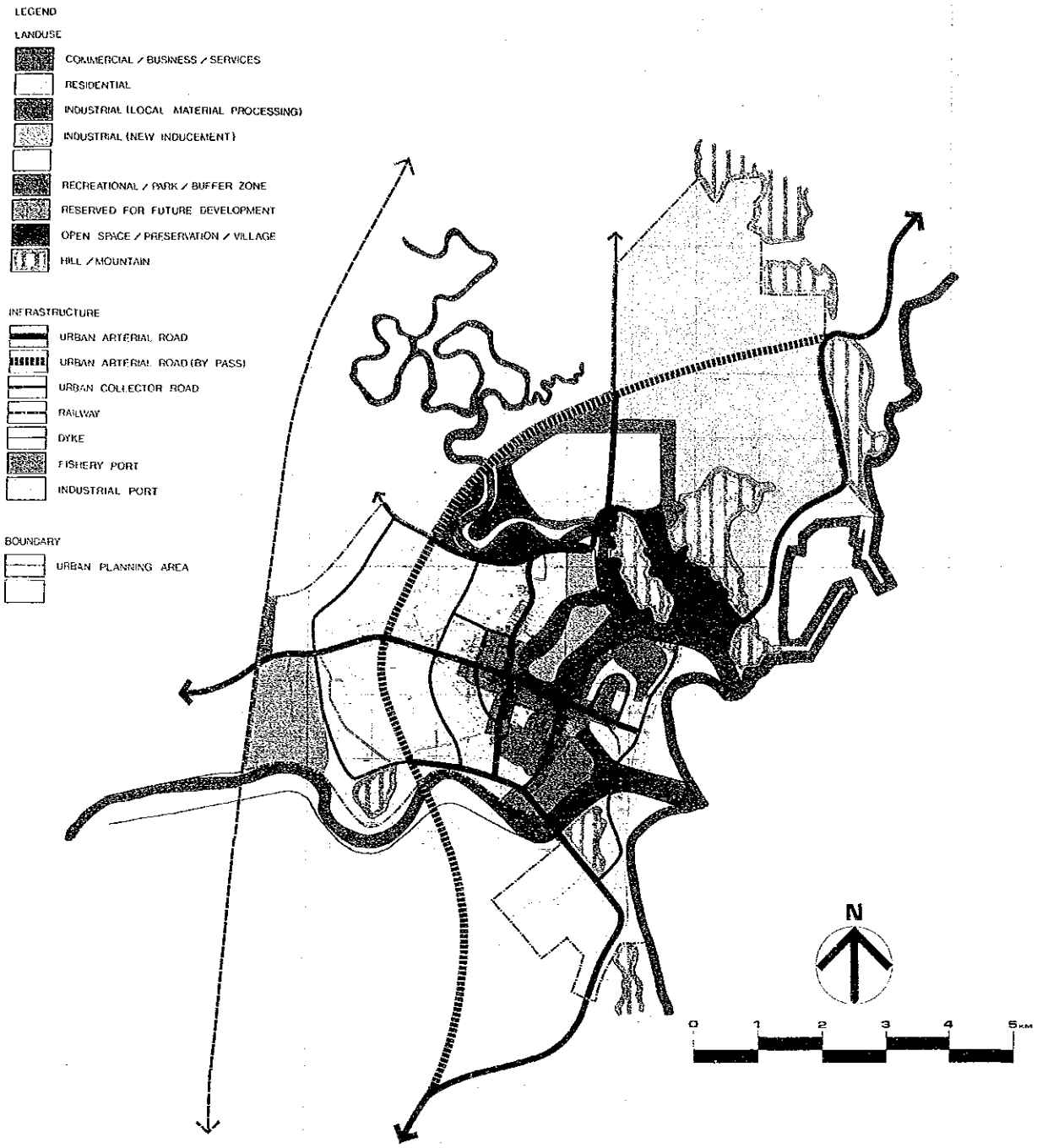


Fig. 7 CUKAI URBAN DEVELOPMENT IN 2000

Research and experimental institutes should also be invited. Their subjects should be closely related to the agricultural, fishing and industrial sectors and urbanization in the study area. They should be organized so that productive sectors and urban community can utilize advantageously the results of research studies. In addition, there should be research institutes which are independent of the conventional sectors, looking for new technology and development. Examples are those in the study of biochemistry, new materials, energy, etc.

Image

Location of these institutes and schools will strengthen the regional image of South Terengganu as the new complex of industrieal integration of agro-based and heavy industry and research.

7. SPATIAL SETTING

7.1 Human Settlement Development

Population

The socio-economic framework of the area results in the forecast population of 304,000 in the year 2000. The distribution amongst the zones is shown in Fig. 8.

Settlement Hierarchy

Settlements comprise a hierachial pattern which was shown by the Terengganu Master Plan Study. This regional study reviewed the hicrarchy and proposed a system shown in Table 8 and Fig. 9.

In this settlement hierarchy system, Dungun, Kerteh and Cukai are classified as sub-regional centres. The study team proposes the "Growth Corridor" as a metropolitan function formed by integrating these three centres. The level of services to be provided by the "Growth Corridor" will be high enough to support expected industrial development as well as basic urban functions.

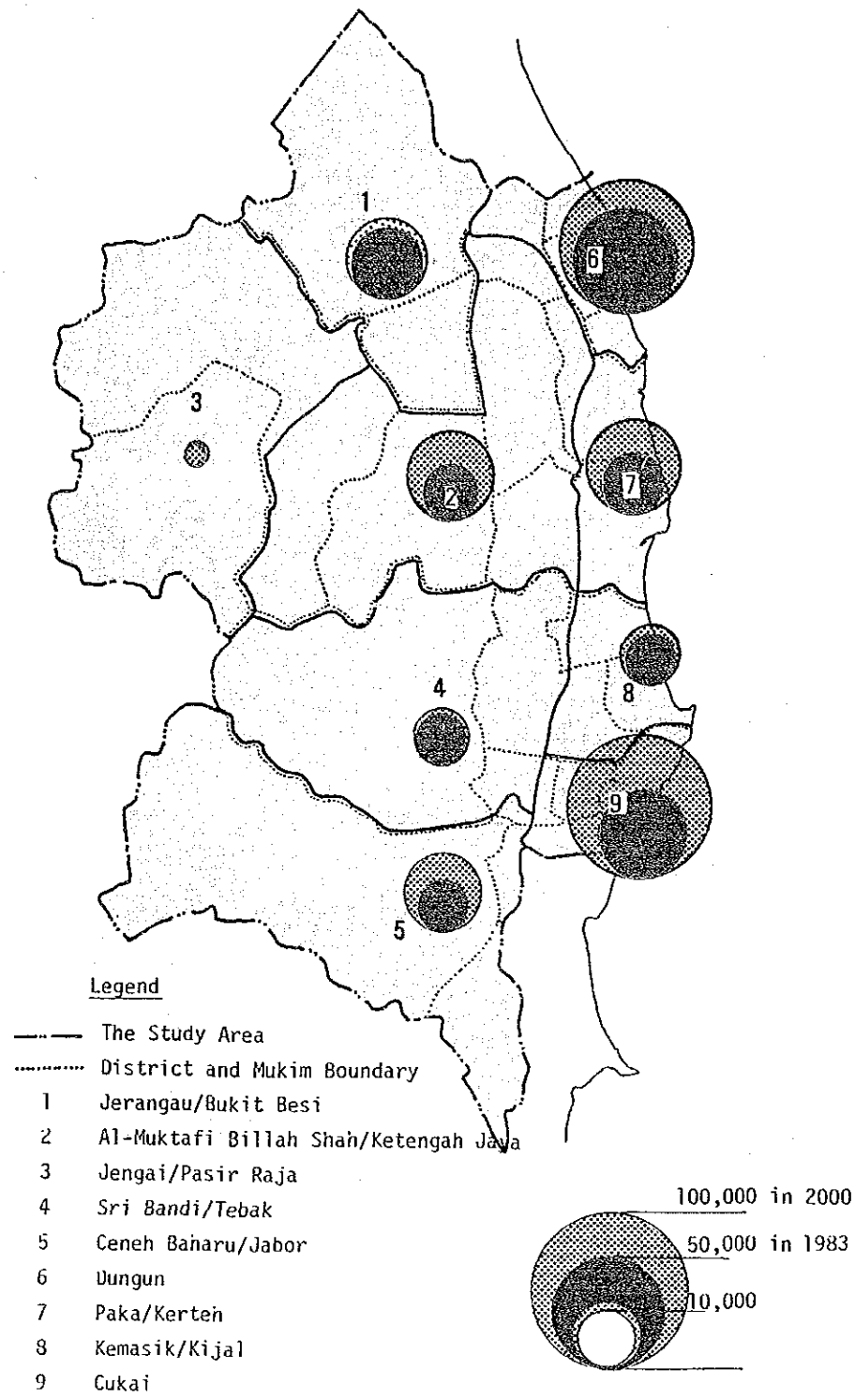
The population of Al-Muktafi Billah Shah is about 2,120 in 1983 and will be 13.3 thousand in the year 2000. As long as the magnitude of population is noted, it is difficult for Al-Muktafi Billah Shah to function as a sub-regional centre in the planning period. However, its locational significance should be taken into account as well.

From a locational viewpoint, the two centres of Ketengah Jaya and Sri Bandi which are ranked at sub-district centre level are evaluated as significant because of their intermediate locations between the KETENGAH agricultural area and the coastal strip area. These two centres are promising enough to accommodate a variety of urban service functions including agro-based processing and some transport service industries. Ketengah Jaya and Sri Bandi will have populations of about 20 thousand and about 7 thousand in 2000, respectively.

Urban Functions in the Sub-Regional Centres

Basically the Study recognizes that the growth corridor consisting of the three sub-regional centres of Dungun, Kerteh and Cukai functions as one urban centre. This will serve the whole hinterland of the Study Area, with a population of 304 thousand in 2000, at basically high functional level. However, at middle or low functional levels, each town is to possess its own urban services functions in response to the magnitude of its hinterland designated in the settlement hierarchy system.

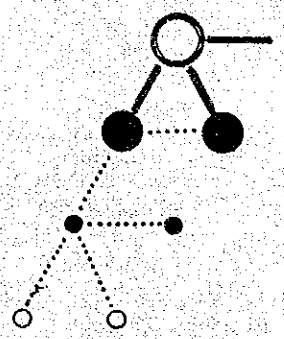
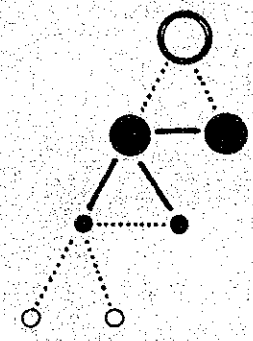
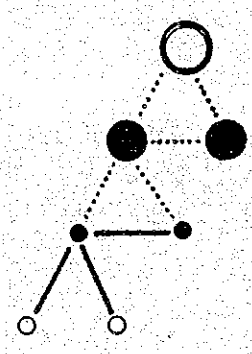
The allocation of urban functions among the three core towns is proposed as shown in Fig. 10.

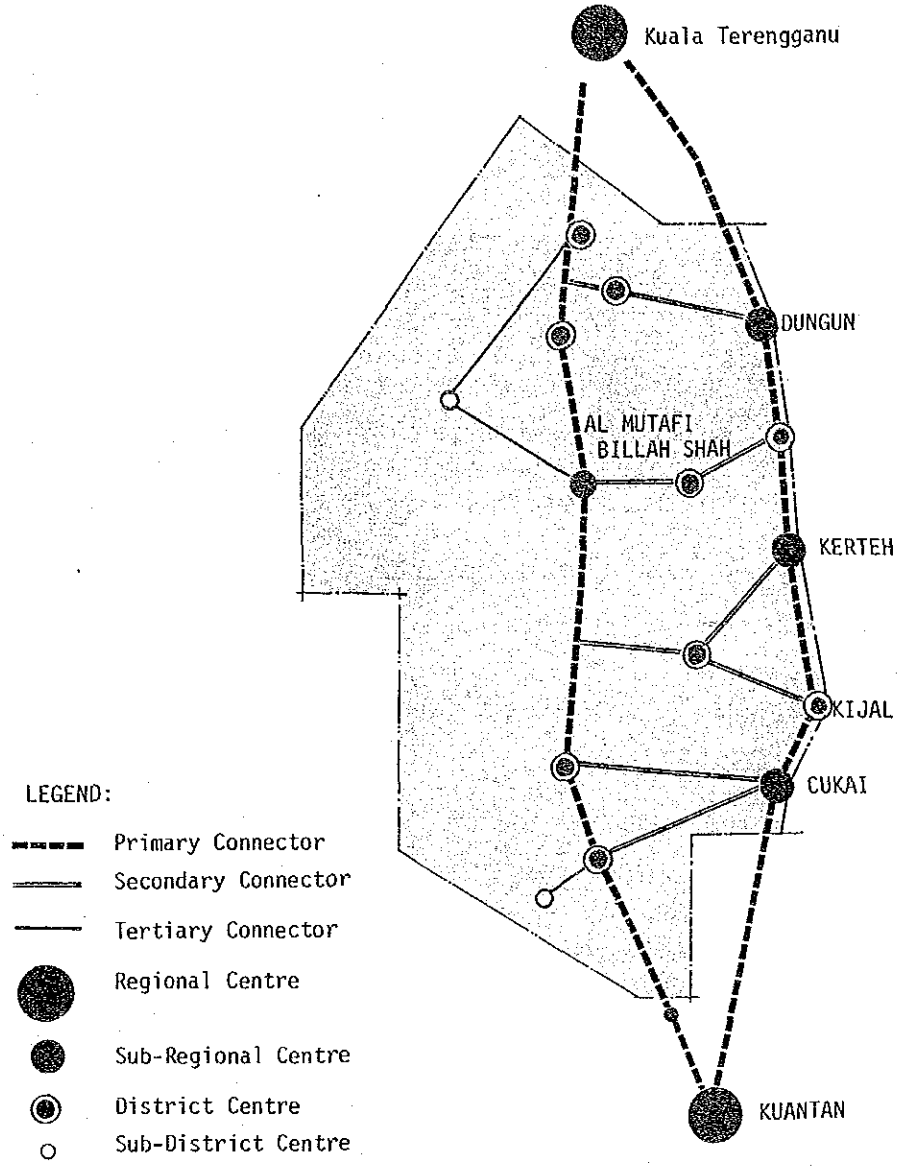


Black circle indicates the population in the year 1983 and Dotted circle the year 2000.

Fig. 8 POPULATION DISTRIBUTION PATTERN IN 2000

Table 8 Communication Hierarchy System

	I Primary Connector	II Secondary Connector	III Tertiary Connector
Relation with Settlement Hierarchy System – Regional Centre – Sub-Regional Centre – District Centre – Sub-District Centre			
Road Network System (Function) – Responsibility –	Inter-regional Major Road (Arterial) – Federal –	Regional Major Road (Collector) – State –	Regional Road (Local) – Local –
Public Transportation Network System	Inter-regional Service Route	Intra-regional Service Route	Community Service Route
Other Infrastructure	Stem Line	Sub-Stem Line	Feeder Line



Source: Study Team

Fig. 9 SUB-REGIONAL BASIC SPATIAL STRUCTURE IN SOUTH TERENGGANU

Function	Dungun	Kerteh	Cukai
1. Administrative	***	–	**
2. Commercial/Business	***	**	***
3. Education	***	*	*
4. Medical Care	**	**	**
5. Recreation	***	**	*
6. Distribution	*	*	***
7. Industrial	*	**	***

Note: *** Sub-regional level
** Intermermediate
* Town Level

Fig. 10 HIGH LEVEL URBAN FUNCTIONS ASSIGNMENT

7.2 INDUSTRIAL SETTING

A spatial structure into which all industries are incorporated is delineated as shown in Fig. 11. This figure conceptually shows interrelationship between industries, major flow of products and the characteristics of the KETENGAH and the coastal strip industries.

8. PRIORITY PROJECTS

Sector studies have been made on identifiable projects and reviewed for their existing status, development potential and constraints. This has resulted in a selected number of projects and programmes. They are assessed for their contribution towards the realization of the objectives of the sub-regional development and are so listed.

The listed projects and programmes are again screened for the further consideration as being conductive to the growth corridor development concept. In this process some project items were deleted because they have been covered by the plans already formulated by the State and Federal agencies, or because they will need intensive basic investigation for their justification. The resulting seven priority projects are identified as in Table 9. It is recommended that these projects should be studied in depth to determine implementation schedules.

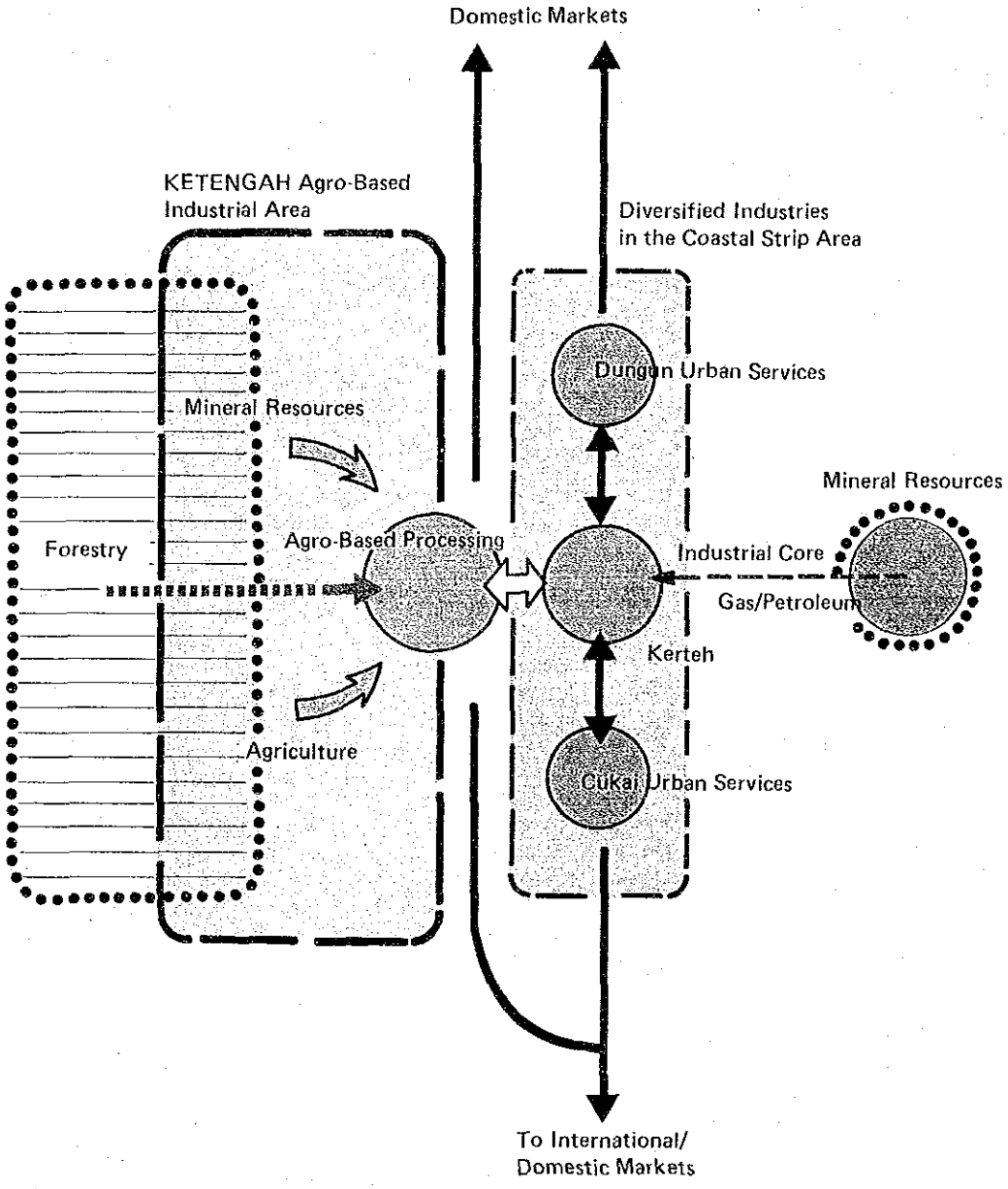
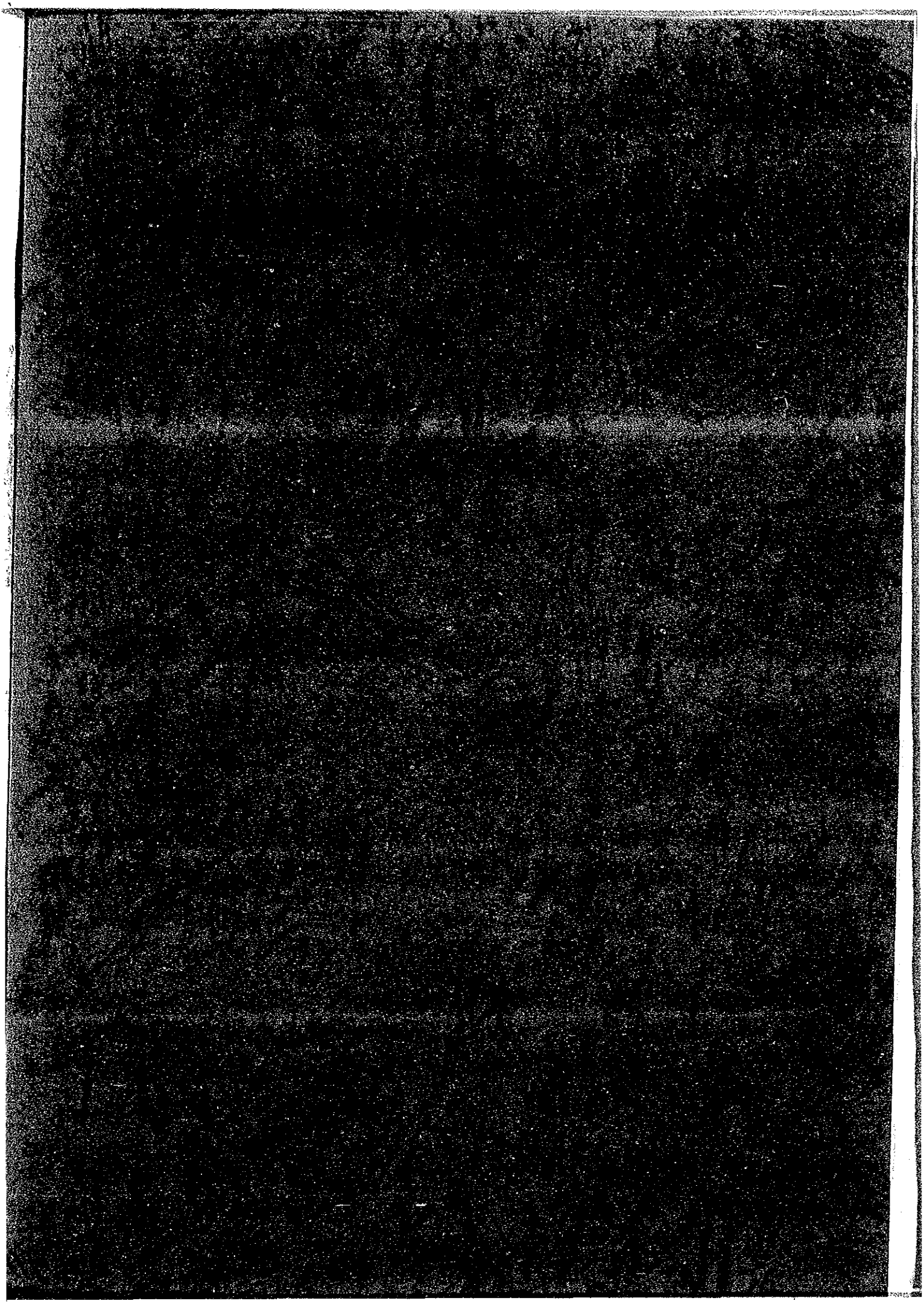
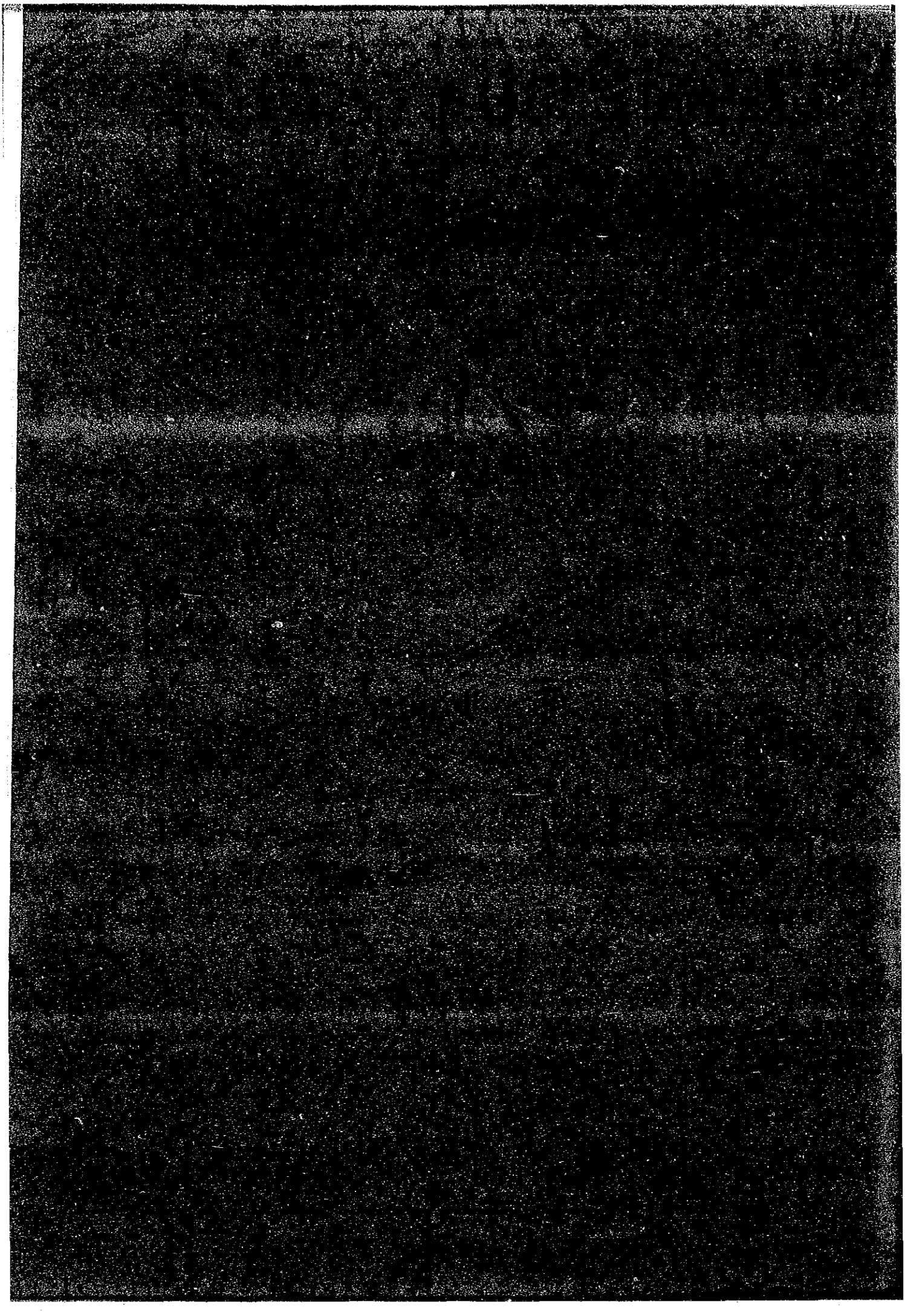


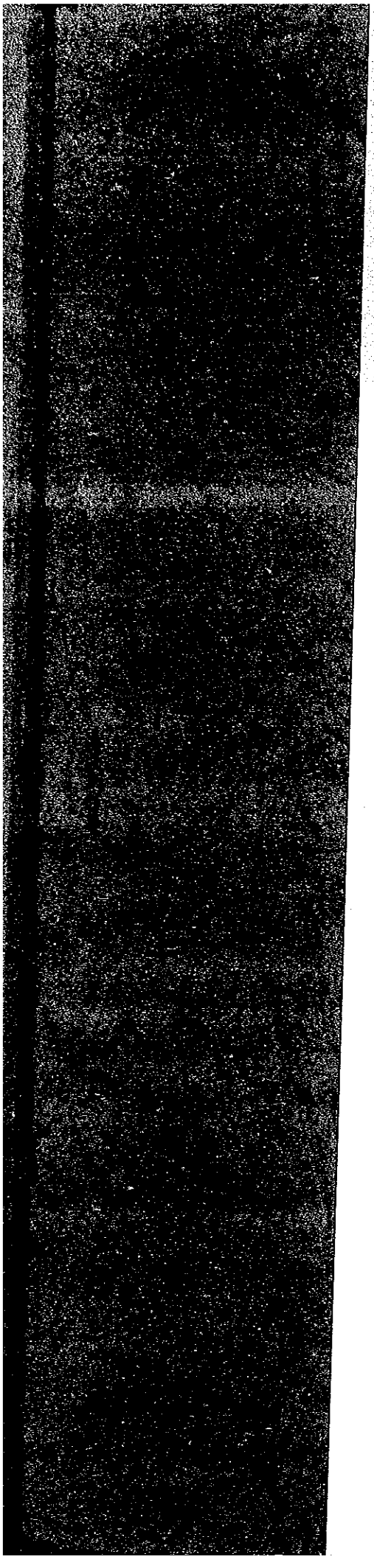
Fig. 11 CONCEPT ON INDUSTRIAL DEVELOPMENT STRUCTURE

Table 9 Priority Projects

SECTOR	UP TO 1985	1986 - 1990	1991 - 2000	REMARKS
Petrochemical Complex	Continue study on complex project	Determine and construct a complex	Develop petrochemical downstream industries	The result of prefeasibility study in Volume 4
Public Transportation	Study on public transportation system in the sub-region especially along the "Growth Corridor"	subsidize or organize a transport company to provide services	Continue to intensify the service	
Dungun Town area Drainage	Study on town area drainage plan in coordination with present development progress and land supply programme Review Dungun Drainage Master Plan	Implementation of the programme together with land supply and by-pass road construction	Continue development	Overall river basin drainage plan should be coordinated with the urban area drainage plan
Cukai Town area Drainage	Study on river improvement and town area drainage plans in coordination with present development progress and land supply	Implementation of the programme together with land supply and by-pass road construction	Continue development	The result of prefeasibility study in Volume 2
Urban Land Supply	Study & investigate the land readjustment and legislation therefore	Execution of Project	Continue development	
	Study on swamp reclamation & rehabilitation in coordination with flood mitigation programme	Large scale execution of housing development	Continue development	
Dungun by-pass road	Engineering study in coordination with urban land supply programme and initiate drainage programme	Construction of by-pass road	Up-grading the geometric feature (2L - 4L) of roads	
Cukai by-pass road	Engineering study in coordination with urban and industrial land development and integrated drainage programme	Construction of by-pass road to circuit urban places	Up-grading and extension of by-pass road sections (2L - 4l)	







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